What is claimed is:

1. A process for preparing 1,6-hexanediol from a carboxylic acid mixture which comprises adipic acid, 6-hydroxycaproic acid and small amounts of 1,4-cyclohexanediols and is obtained as a by-product in the oxidation of cyclohexane to cyclohexanone/cyclohexanol with oxygen or oxygen-containing gases and by water extraction of the reaction mixture, by esterification of the acids with C_1- to C_{10}-alcohols and hydrogenation, in which

   a) the mono- and dicarboxylic acids present in the aqueous dicarboxylic acid mixture are reacted with a low molecular weight alcohol to give the corresponding carboxylic esters,

   b) the resulting esterification mixture is freed of excess alcohol and low boilers in a first distillation stage,

   c) a separation of the bottom product is carried out in a second distillation stage into an ester fraction substantially free of 1,4-cyclohexanediols and a fraction comprising at least the majority of the 1,4-cyclohexanediols,

   d) the ester fraction substantially free of 1,4-cyclohexanediols is catalytically hydrogenated and

   e) 1,6-hexanediol is obtained in a purifying distillation stage from the hydrogenation effluent while removing an alcohol-low boiler mixture in a manner known per se,

   which comprises removing alcohol by a membrane system from the mixtures, obtained after the esterification in stage b) and/or after the hydrogenation in stage e), of alcohols and low boilers and recycling it into the esterification.

2. The process according to claim 1, wherein alcohol is removed by a membrane system from the mixtures obtained in stage b) and stage e).

3. The process according to claim 1 or 2, wherein methanol is removed.

4. The process according to any of claims 1 to 3, wherein the membrane system consists of at least one membrane.

3 drawings

5. The process according to any of claims 1 to 4, wherein the transmembrane pressure differential is from 20 to 200 bar.

6. The process according to any of claims 1 to 4, wherein the temperature of the mixture obtained in stage b) and/or e), as the feed stream of the membrane separation, is from 20 to 90°C.